Hiroshi HARA* & Sachiko KUROSAWA*: **Differentiation within *Anemone Hepatica* L. of Japan****

原 寛*・黒澤幸子*：日本産スハマソウ類における分化**

with 2 plates

The *Anemone Hepatica* group of Japan was revised by Nakai in 1937 and by Hiroe in 1957, and by both authors the Japanese plants have been treated as the variety of the European species. It is notable that Hiroe found tetraploid and hexaploid plants in Japan, but his paper contains some misleading statements.

The Japanese plants have often been divided into two varieties by the shape of leaf-lobes; i. e. var. *nipponica* (Nakai), which is called 'Suhamasô' in Japanese, having roundish or obtuse leaf-lobes, and var. *japonica* (Nakai), 'Misumisô' in Japanese, having acute leaf-lobes. Hiroe (1957) concluded that var. *japonica* is diploid, while var. *nipponica* is tetraploid, and his new var. *pubescens* with roundish pubescent leaf-lobes is hexaploid. The relationship among them, however, is not so simple, and the material hitherto used for cytological investigations also needs further taxonomical examination.

But, as no original locality was given, it was difficult to trace the original habitat of the plants cytologically studied by Sugiura ($2n=16$) in 1931, by Nakajima ($2n=14$) in 1933, and by Kurita ($2n=14$) in 1956.

As regards var. *nipponica*, Nakai unfortunately did not designate the type specimen in his original publication. So we here choose as the lectotype of the variety the specimen illustrated there as Fig. 4 under the name var. *nipponica* by Nakai himself. That specimen was collected at Kamakura, prov. Sagami by Y. Momiyama (no. 279) on March 16, 1932 (TI), and it has mainly obtuse leaf-lobes.

The plant reported by Matsuura & Suto in 1935 as '*Hepatica triloba* Chaix var. *obtusa* Wood' from Is. Sado seems to be var. *nipponica*. Its somatic chromosomes are 14, consisting of 4 pairs with median constrictions, 2 pairs with submedian ones, and 1 pair with subterminal ones bearing a large satellite. Kurita reported in 1955 that the karyotype of '*Hepatica acuta*' form Mt. Bukô in Chichibu is $2n=14=12A^{m}+2^{t}B^{st}$, and this material was considered by Hiroe as var. *japonica*. But as far as we know, the plant growing on Mt. Bukô belongs to var. *nipponica*.

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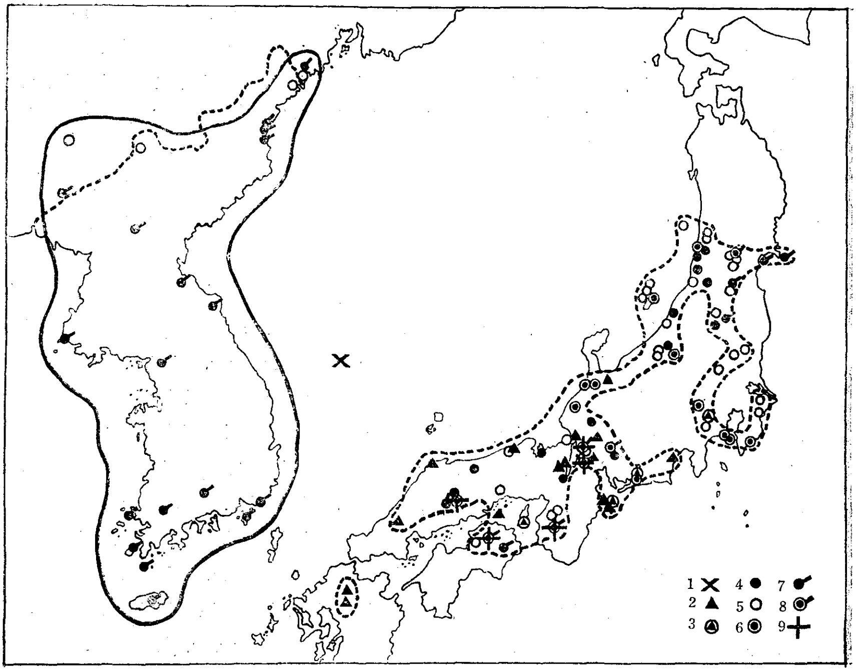
In the present study, we have examined somatic chromosomes in root-tip cells, using the Tjio and Levan's method with a slight modification, of the following 13 collections which include the population from the type locality of var. *nipponica* and are all referable to the same variety (cf. Map 1, ◉).

Ôyama, prov. Uzen	Awabi-goe, prov. Sado
Kiyotsukyô, prov. Echigo	Jôge, prov. Rikuzen
Kamakura, prov. Sagami	Mt. Jinmuji, prov. Sagami
Mt. Kiyodzumi, prov. Awa	Magoshi, Toyohashi, prov. Mikawa
Jôkôji, prov. Owari	Kitayama-mura, prov. Mino
Jôhana, prov, Etchu	Kanazawa, prov. Kaga
Yamanaka-onsen, prov. Kaga	

These natural populations are all diploid, and their karyotype can be expressed



Map 1. Distribution of the *Anemone Hepatica* group in the Far East. 1. *Anemone maxima.* 2. *A. Hepatica* var. *japonica.* 3. Do, cytologically examined. 4. *A. Hepatica* var. *japonica* f. *variegata.* 5. Do, taken from literatures. 6. Do. cytologically examined. 7. Specimens with leaves pubescent on both surfaces. Those in Korea belong to var. *asiatica.* 8. Do, cytologically examined. 9. Tetraploid var. *pubescens* cytologically verified.

as follows: $2n=14=8A^{m}+4B^{sm}+2^{t}C^{st}$

The distinction between A and B chromosomes is sometimes obscure, but at least two pairs of chromosomes clearly have submedian constrictions. In this species, chromosomes are often heteromorphic, and especially a population from prov. Uzen seems to have b-chromosome. The plant of this group will be an interesting material for detailed cytogenetical investigations.

The plants on the Japan-Sea side of northern and middle Honshu are generally much larger than the typical var. *nipponica* on the Pacific side. Nakai included all plants from northern Honshu in his var. *nipponica*, but a large plant from prov. Uzen was named by Hiroe as var. *japonica* f. *magna*. The shape of its leaves, however, is nearer to var. *nipponica* than to var. *japonica*, as Nakai has suggested. Although this form has larger leaves than the typical var. *nipponica*, it is diploid with $2n=14$ chromosomes. Hiroe mentioned that only f. *magna* has one pair of the smallest chromosomes with a subterminal constriction. But we observed one pair of subterminal chromosomes with a satellite in almost all diploid populations mentioned above, as already noted by Matsuura & Suto and Kurita. It is interesting that plants from Jôge and Jôkôji have leaves hairy on both surfaces as in var. *pubescens*, but they are diploid too.

The typical var. *japonica* which has acute or acuminate lobes of leaves as shown in Fig. 13 of Nakai's paper is rather rare and is scattered here and there in middle and western Japan. A population of this variety from Mt. Asama, prov. Ise was reported as diploid by Hiroe, and those from Mt. Kisshô, prov. Mikawa and Minenoyakushi, prov. Sagami and the one from Mt. Kashihara, prov. Awaji with small acutish leaf-lobes examined by us were also diploid (Map 1, ▲).

Both tetraploid ($2n=28$) and hexaploid ($2n=42$) plants referred by Hiroe to var. *nipponica* and var. *pubescens* respectively were collected on Mt. Fujiwara in prov. Ise. We have also cytologically examined several individuals from the same mountain collected by ourselves, and they were proved to be all tetraploid. For these polyploid varieties Hiroe gave a wide range in Japan, but we have so far found tetraploid plants only from five localities in western Honshu and eastern Shikoku as follows:

Mt. Ibuki, prov. Mino	Mt. Fujiwara, prov. Ise
Mt. Kôya, prov. Kii	Kusama-mura, prov. Bitchu
Mt. Ryûwô, prov. Awa, Shikoku.	(cf. Map. 1, +)

These plants, except for those from prov. Bitchu, have leaves with roundish lobes pubescent on both surfaces, and rather small white flowers with fewer pistils and stamens. While those of prov. Bitchu have leaves glabrous on the upper surface, and white or pink flowers as large as in diploid var. *nipponica*. We here apply the name var. *pubescens* Hiroe to this tetraploid race, because the name var. *nipponica* adopted by Hiroe cannot be used for this race as explained above. It is doubtful whether the holotype specimen of var. *pubescens* collected on Mt. Fujiwara by Z. Tashiro in 1937 (KYO) which was not cytologically examined, is tetraploid or hexaploid.

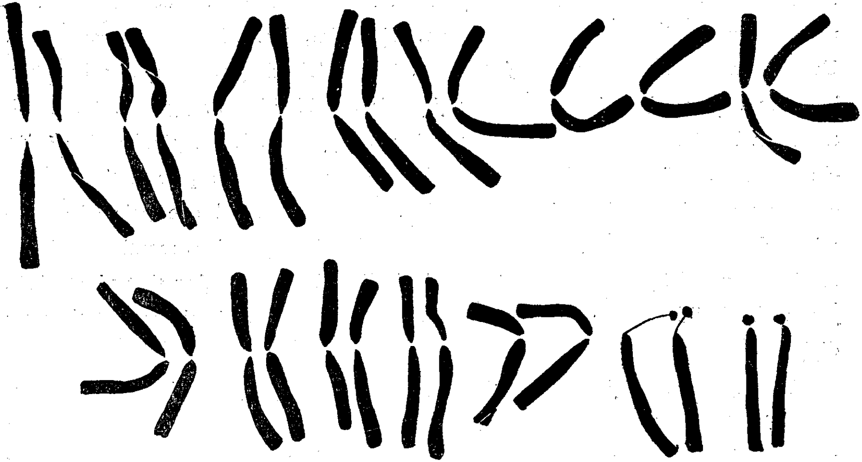


Fig. 1. Somatic chromosomes of *Anemone Hepatica* var. *pubescens* from Mt. Ryuwo, prov. Awa, Shikoku. (×ca. 1750)

It is noteworthy that examination of pollen grains shows significant difference in pattern between the diploid and tetraploid plants. All diploid plants examined by us including European and N. American ones have normal 3-colpate pollen grains 26–34μ across. On the other hand, tetraploid plants have always poly-rugate pollen grains which have no definite equatorial plane, and are 33–36μ across, although the number of rugae varies from 6–12. A few individuals of f. *magna* tend to become female, and their stamens show various degrees of abortion. In an extreme case, the stamens are very short, 1–2 mm long, and rod-like, completely lacking anthers. Even when anthers seemingly develop, pollen grains contain a high percentage of small sterile ones, and their pattern becomes sometimes not normal 3-colpate.

It is reasonable to consider that the tetraploid plants of *Anemone Hepatica* in Japan are derived from the diploid ones. If so, polyrugate pollen grains may be derived from 3-colpate ones in this species. The similar relation of pattern of pollen grains to polyploidy is also observed in other Japanese species of Ranunculaceae; e. g. *Pulsatilla cernua* Berch. et Presl (3-colpate pollen grains, 2n=16) versus *P. nipponica* Ohwi (6—poly-rugate, 2n=32), and presumably *Isopyrum Numajirianum* Makino versus *I. hakonense* Maekawa et Tuyama. But generalization of this view is a matter for careful consideration, as pattern of pollen grains is liable to variation especially in this family. Ikuse observed those two kinds of pattern even in a single species, for example in *Callianthemum Miyabeanum* and *Actaea asiatica*. On the other hand, Pop remarked in 1937 that pollen grains of *Anemone Hepatica* and *A. Falconeri* are smaller with 3 pores, while those of *A. transsilvanica* and *A. Henryi* are larger with 4–6 pores, and that the number of pores in pollen grains is an important diagnostic character and a genealogical criterion in the genus *Anemone*. As *A. Falconeri* Thomson of Kashmir, Pamir, and Alatau has some prototypic morphological characters in Sect. Hepatica, it is likewise not inconsistent to consider that polyrugate pollen grains are derived from 3-colpate ones also in Ser. Angulosa of Hepatica, but in this case *A. transsilvanica* with polyrugate pollen grains was reported to be diploid (2n=16). Evaluation of pattern of pollen grains will be different in different groups of plants, and the interrelationships within their patterns should hereafter be analysed from the evolutionary aspect.

Measurement of stomata on the lower surface of leaves shows no distinct difference between diploid and tetraploid races. The length of stomata in both races collected from various localities and cultivated in Tokyo ranges from 43 to 58 μ, contrary to Hiroe's account in 1957.

Judging from the data now available, most of the Japanese plants of the *Anemone Hepatica* group are diploid, and the tetraploid race is observed only in western Honshu and Shikoku as mentioned above. On the diploid level, the Japanese plants are considerably polymorphous. They have often been divided into var. *nipponica* and var. *japonica* by the shape of leaves, although the distinction between them is not clear, and intermediate forms connecting them are not uncommon. They are also variable in the number, shape, size, and colour of petal-like sepals, and nearly one hundred horticultural forms had been cultivated as a pot plant, as recorded in old Japanese literatures,[1] but they have mostly been lost at present. The flowers of the plants, f. *magna*, growing on the Japan-Sea side of Honshu are rich in colour, ranging from blue, violet, purple, rose to white, and are 1.5–3.2 cm in diameter, while those on the Pacific side are mostly white and rarely pink. On the other hand, polyploid plants are rather small and less variable in this species.

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[1] The most important work is 'Chôraku-kwafu' (長楽花譜) published in 1841, including 68 coloured drawings of cultivated forms.

Individuals with variously variegated leaves are commonly found in almost all populations in Japan, although the name, f. *variegata*, was given to a variegated form of diploid var. *nipponica*.

The habitats of *Anemone Hepatica* in Japan are scattered and localized, often showing wide gaps especially in central mountain districts of middle Honshu (Map 1). It occurs usually on hills or mountains up to ca. 900 m high of generally the Tertiary formation, and is sometimes growing on calcareous soil, and it has not been found on volcanic mountains of the Quaternary period.

In Korea, the *Anemone Hepatica* group has strikingly differentiated. *Anemone maxima* Nakai of Dagelet Island in the Japan Sea is a characteristic good species in having gigantic leaves 8–13 cm broad, with depressed roundish lobes, which are glabrous above and sericeo-villose beneath, larger bracts 1–2.5 cm long, larger flowers, larger roundish achenes which are 5–6 mm long and quite glabrous from the first, and sessile stigmas. This largest race in this group seems to be also diploid, judging from its 3-colpate pollen grains.

The common race in Korea described by Nakai as *Hepatica asiatica*, however, is very similar to the Japanese one. But its leaves are always hairy on the upper surface, and are said to be annual, while those of the Japanese plants are persistent through the winter. Nakai laid emphasis on this last character, but it seems to be improper to separate the Korean one specifically from the Japanese. Another race from the southern islands of Korea named by Nakai as *Hepatica insularis* very much resembles *H. asiatica*, but is smaller in all respects. All these Korean plants have 3-colpate pollen grains.

For the purpose of comparison, we have also cytologically examined *Anemone Hepatica* L. (*Hepatica nobilis* Schreber) from Sweden and *A. americana* (DC.) collected near Washington, D. C. by the senior author, in 1954. Although widely separated geographically, *A. Hepatica* of Europe closely resembles the Japanese plants, and we agree to treat all of them as conspecific. So far as we have examined, filaments of inner stamens are often hairy in the European plants, while they are always glabrous in the Japanese ones. The range of variations in leaves and flowers is almost the same as that of the Japanese plants. There are no clear differences in chromosomes and in pollen grains between European and Japanese diploid plants. It is interesting that Langlet in 1927 reported a tetraploid plant of *A. Hepatica* var. *multiloba*, and Moffett in 1932 observed tetraploid cells in European *A. Hepatica.*

Anemone americana (*Hepatica americana* (DC.) Ker) differs from *A. Hepatica* in having more roundish lobes of leaves which are softly pubescent on both surfaces, and slender styles with a smaller stigma. In our material we observed 14 somatic chromosomes and 3-colpate pollen grains similar to those of *A. Hepatica.*

As Ulbrich has suggested, the *Anemone Hepatica* group is considered to be of old origin, and it must have already been widely distributed in temperate regions of Eurasia and North America in the Tertiary period. Then its area was separated into three isolated regions, Europe, East Asia, and North America. Polyploidy does not seem to be an important factor in speciation of this group. The wide variations in outer morphological characters have evolved at the diploid level, and parallel variations in the shape of leaves, the colour of sepals, etc. are observed in each region.

The genus *Anemone* is heterogenous, and the phylogenetical relationships within groups of the genus have not been definitely established as yet. In recent years, *Hepatica* has often been accepted as a valid genus mainly in having simple 3-lobed radical leaves, and entire sessile involucral bracts close to the flower. Even in *Hepatica*, however, *Anemone transsilvanica* (Fuss) Heuffel has deeply dissected leaf-lobes and often 3-dentate bracts, and *A. Falconeri* Thomson has inciso-serrate leaf-lobes and pedicellate flowers. Whereas some species belonging to Sect. Anemonanthea of *Anemone* become near to Sect. Hepatica in some outer morphological characters. Cytologically the *Anemone Hepatica* group has large chromosomes of the *Ranunculus* type with the [basic number 7. Gregory presumed that the 7-chromosome group in *Anemone* was derived from some 8-chromosome ancestor. We now notice that some species of Sect. Anemonanthea (*A. flaccida*, *A. Keiskeana*, etc.) and Sect. Homalocarpus also have large chromosomes with the basic number 7 similar to those of Sect. Hepatica. On the other hand *Anemone transsilvanica* Heuffel included in Sect. Hepatica was reported to have chromosomes with the basic number 8 by Pop in 1937. So there seems to be no decisive character by which *Hepatica* is clearly separated from *Anemone* as an independent genus. If the genus *Anemone* is treated in such a wide sense as to include variable sections, e. g. Homalocarpus (*A. narcissiflora*) and Eriocephalus (*A. coronaria*, *A. vitifolia*, etc.), Hepatica should also be retained within *Anemone*.[1] Further informations on the species belonging to Ser. Angulosa of

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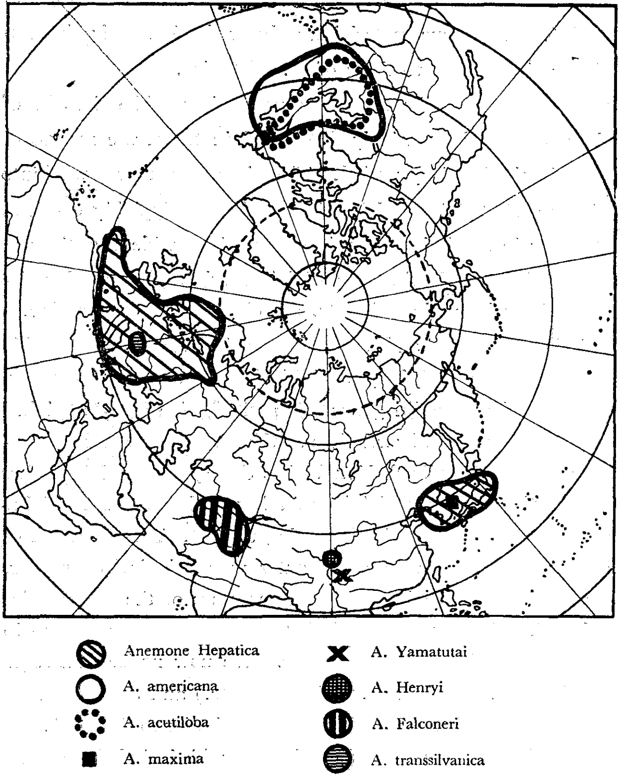
1) **Anemone americana** (DC.) Hara, comb. nov. *Hepatica triloba β. Americana* DC., Syst. Nat. **1**: 216 (1817). *Hepatica americana* (DC.) Ker in Bot. Reg. **5**: t. 387 (1819).

Anemone Yamatutai (Nakai) Hara, comb. nov. *Hepatica Yamatutai* Nakai in Journ. Jap. Bot. **13**: 311 (1937).

Hepatica are much needed to clarify the phylogeny of Hepatica and its allies.

Under the present circumstances, the East Asiatic races of the *Anemone Hepatica* group are treated as follows:



Map 2. Distribution of *Anemone* Sect. Hepatica.

Anemone Hepatica L., Sp. Pl. ed. 1, **1**: 538 (1753).

Hepatica nobilis Schreber, Spicil. Fl. Lipsic. 39 (1771).

var. **japonica** (Nakai) Ohwi, Fl. Jap. 518 (1953), comb. nud.; in Bull. Sci. Mus. Tokyo **33**: 71 (1953)—Hiroe in Bot. Mag. Tokyo **70**: 6 (1957).

f. **japonica.** ミスミソウ

'*Hepatica triloba* Chaix *β. acuta* Wood': Makino in Journ. Jap. Bot. **6** (8): 18 (1929).

H. nobilis var *japonica* Nakai in Journ. Jap. Bot. **13**: 241, f. 13 & 307 (1937)—Hara in Journ. Fac. Sci. Univ. Tokyo sect. 3, **6**: 51 (1952).

Dist. Honshu, mainly in western regions, and northern Kyushu.

f. **magna** Hiroe in Bot. Mag. Tokyo **70**: 7 (1957). オオミスミソウ

Dist. Northern and middle Honshu, on the Japan-Sea side.

f. **variegata** (Makino) Hara, comb. nov. スハマソウ

H. triloba α. obtusa Wood f. *variegata* Makino in Journ. Jap. Bot. **6** (8): 17 (1929), cum subf. *concolor* et *hypopurpurea* Mak.

H. nobilis var. *nipponica* Nakai in Journ. Jap. Bot. **13**: 234, f. 4, t. 1 & 306 (1937), cum f. *typica*, f. *variegata* (Mak.) et f. *hypopurpurea* (Mak.) Nakai.

Anemone Hepatica var. *japonica* f. *nipponica* (Nak.) Ohwi, Fl. Jap. 518 (1953), comb. nud.; in Bull. Sci. Mus. Tokyo **33**: 71 (1953).

A. Hepatica var. *nipponica* (Nakai) Hiroe in Bot. Mag. Tokyo **70**: 7 (1957).

Dist. Honshu, mainly on the Pacific side.

var. **pubescens** Hiroe in Bot. Mag. Tokyo **70**: 7 (1957). ケスハマソウ

Leaf-lobes roundish, often hairy on both sides. Pollen grains 6—10-rugate, 33–36μ across. Chrom. $2n=28$ (or 42).

Dist. Western Honshu, and eastern Shikoku.

var. **asiatica** (Nakai) Hara, comb. nov.

Hepatica asiatica Nakai in Journ. Jap. Bot. **13**: 237, f. 9 & 10, & 309 (1937), cum f. *acutiloba*, f. *obtusiloba* et f. *variegata* Nakai.

H. nobilis var. *asiatica* (Nakai) Hara in Journ. Fac. Sci. Univ. Tokyo sect. 3, **6**: 51 (1952).

Dist. Korea, South Manchuria, and Ussuri.

f. **insularis** (Nakai) Hara, stat. nov.

Hepatica insularis Nakai in Journ. Jap. Bot. **13**: 240, f. 11 & 308 (1937).

Dist. South Korea.

Anemone maxima Nakai in Bot. Mag. Tokyo **31**: 27 (1917).

Hepatica maxima (Nakai) Nakai, Veg. Dagelet Is. 19 & 35 (1919); in Journ. Jap. Bot. **13**: 237, f. 7 & 8, & 306 (1937).

Endemic in Dagelet Is.

Summary

1) 21 populations of *Anemone Hepatica* growing wild on non-volcanic hillsides of Japan were examined cytologically as well as morphologically. Of these, 16 populations were diploid ($2n=14$), and 5 were tetraploid ($2n=28$) (cf. Map 1).

2) The diploid plants (var. *japonica*) distributed widely in Japan are very variable in leaves and flowers. The range of their variability and their distribution were noted.

3) The tetraploid plants (var. *pubescens*) are restricted to western Honshu and eastern Shikoku, and are less variable.

4) It is noteworthy that pattern of pollen grains seems to be related to polypoidy in the species. The tetraploid plants having poly-rugate pollen grains can be considered to be derived from the diploid ones having 3-colpate grains.

5) The interrelationships within races from Japan, Europe, and N. America are also discussed.

Main Literatures

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日本のスハマソウ類は花や葉の変化に富んでいることが古くから知られており，また最近広江氏が倍数体を見出されたのは誠に興味が深い。私等も数年前から材料を集めて研究していたが，その分化の様式は仲々複雑である。

日本の 21 個所から採集した生品を調べた結果，その中の 16 個所（ミスミソウの形 3 をふくむ）のものは 2 倍体であり，5 個所のものは 4 倍体であった（分布図参照)。2 倍体は不連続ではあるが日本にかなり広く分布していて外部形態における変異の幅も広く，裏日本にあるものは大形で花色の変化も著しく美しい。4 倍体は主に西日本に散在し，かえって小形で花も小さく白色のものが多い。また染色体における変異も見られ，もっと細胞遺伝学的研究が必要である。

2 倍体植物は，私等の見た資料では外国産もふくめて，その花粉は 3 溝粒であったが，4 倍体では常に 6-12 散溝粒であった。この事は同一種内で倍数性が花粉粒の型と関連する初めての例と思われ特に注目される。そうしてこの類では 6-12 散溝粒の花粉が 3 溝粒のものから導かれたと推定される。葉の気孔にははっきりした差異はみられなかった。

葉の裂片の形によるスハマソウとミスミソウとの区別は中間形があって余りはっきりしない。また葉の上面にまで毛のある形は4倍体に多いが例外もあり，東北地方の東側や美濃には毛の多い2倍体がある。朝鮮，満州のものはすべて葉の上面にも毛があるが花粉は3溝粒で2倍体である可能性が高い。この類中最も大形な鬱陵島産のオオスハマソウはよい種であり，花粉は3溝粒である。

なおスハマソウと欧州産との関係，北米産との比較，*Hepatica* を別属とするかどうかの問題などについても論及した。

終に本研究に対し色々助言して下さった久内清孝先生，田中信徳，幾瀬マサ両博士並びに資料の採集に協力して下さった小川由一，富樫誠，阿部近一，鳥居喜一，井波一雄，森邦彦の諸氏に厚く御礼を申し上げる。

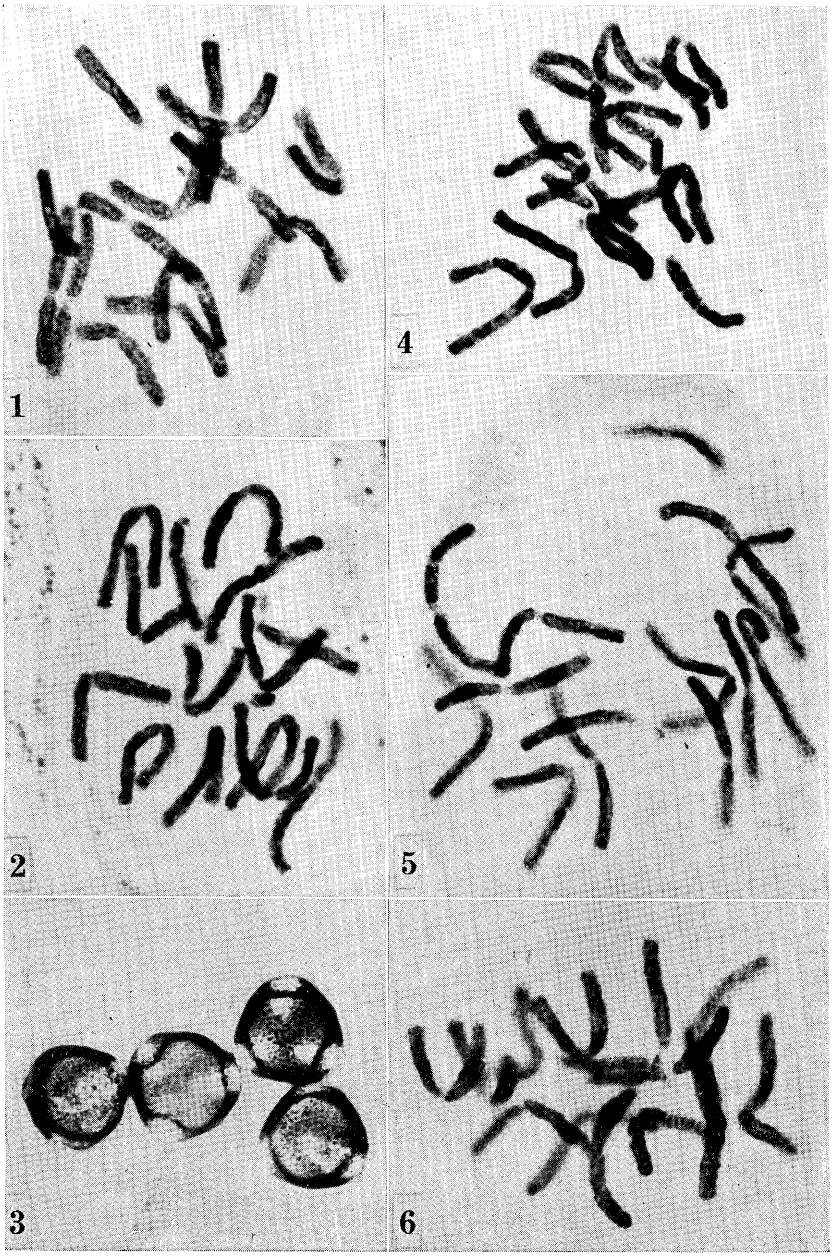
○ブタクサとオオニシキソウ佐渡にもある（久内清孝） Kiyotaka HISAUCHI: Aliens in Island Sado.

本年の夏幾瀬マサ氏が佐渡の南部で採集して来たもののうちにブタクサとオオニシキソウとがあつた。両者共，同島南部の腰細でヒメコバンソウと共に採集したものだという，現地の人はもちろん知つているのであろうが，一般にはあまり知られていない事実と思い帰化植物散布の例として記しておく。まさに，これ等の雑草も佐渡へ佐渡へとなびいたのであろうが，渡島の経路は知るよしもない。その後同島在住の北見秀夫氏に照会したところ昭和27年に採集の折りには見なかつたとのことであるから其後渡島したものと考えられる。

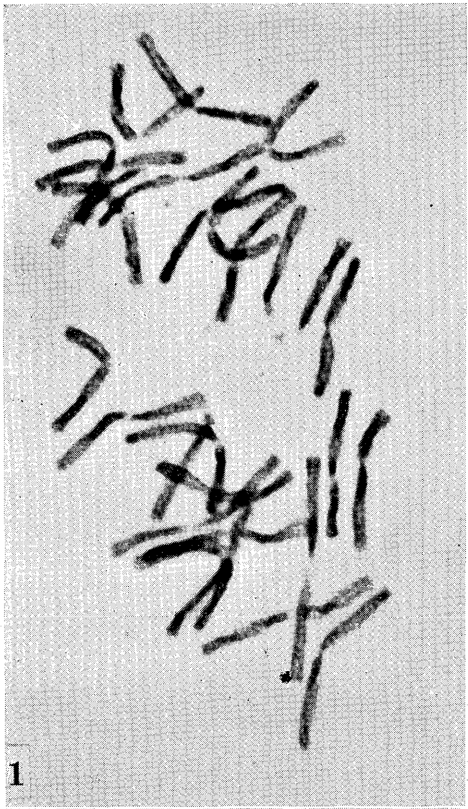
○ユキワリソウ余話（久内清孝） Kiyotaka HISAUCHI: A vanacular name of *Scopolia japonica* Max.

サクラのさく頃になると，東京都下奥多摩の山間でユキワリソウの中毒事件が新聞の種となる。同地方で，この名で呼ぶものはサクラソウ科やウマノアシガタ科のものとは別物のナス科のハシリドコロのことであつて，たべれば中毒するのが当然であるが，この草がこんな名で呼ばれるのは今はじまつたものでないらしい。著者は不詳となつているが寛延二年（1749）に刊行された新著聞集という随筆の第十八に次のような記事がある。

「寛文七年間三月すへの八日に，信州諏訪のもの，野に出て草をつみ，あつものにして喰しより，譫語をいひ，物つきの様にて，十日ばかり過ぎて本復しぬ。ある者のいはく，八年以前に，同州の芹が沢て雪わりといへる草を食して，酒に酔たるがごとくありしとぞ。その草しらまほし」。いうまでもなく症状からおしてハシリドコロである。そうしてこの記事から見ても，この草をユキワリソウと呼ぶ方言が山地にあることを物語つている。文中「酒に酔たるが如く」というのは，分量により起る現象でこの草はもちろん，同様の成分を含むチョウセンアサガオの中毒においても同一であつて後者の中毒や，これを応用した悪盗賊のことが百井塘雨という人の笈埃随筆という（文化年間の刊行）本に見られる。それは兎に角ハシリドコロをユキワリソウということ，また食べると中毒することは古くからわかつていたにかゝはらず今なをくり返されるとは遺かんなことである。



Pl. I. Photomicrographs of somatic chromosome and pollen grains of *Anemone Hepatica* var. *japonica* and *A. americana*. 1, from Mt. Kissho, Prov. Mikawa. 2, Oyama, Prov. Uzen. 3, Johana, Prov. Etchu. 4, Joge, Prov. Rikuzen. 5, near Washington, D. C. 6, Minenoyakushi, Prov. Musashi. (1, 2, 4, 5, 6 ×ca 1450)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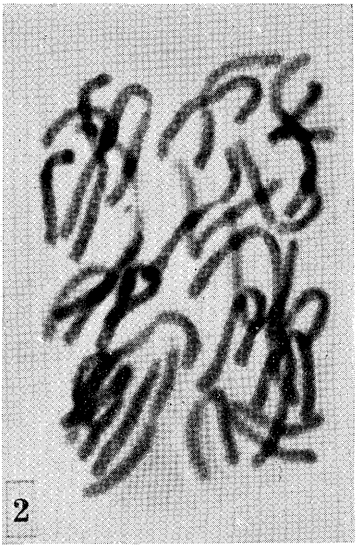
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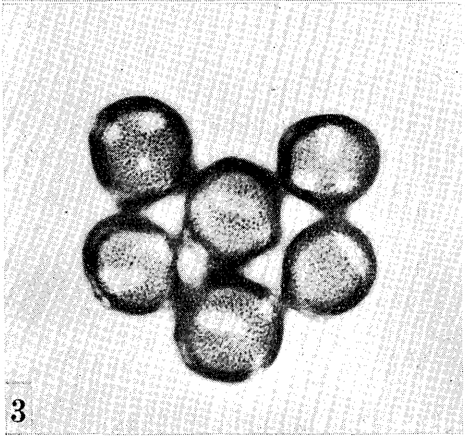
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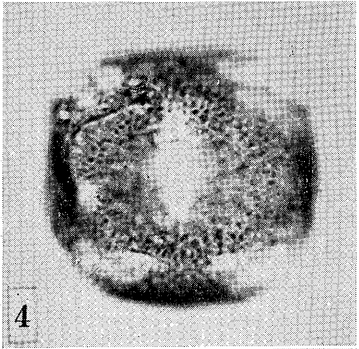
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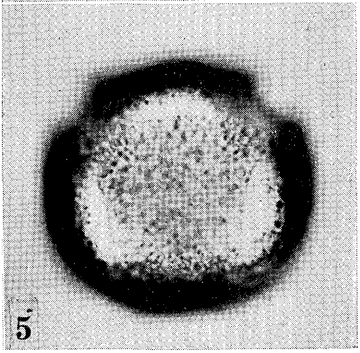
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Pl. II. Photomicrographs of somatic chromosomes and pollen grains of *Anemone Hepatica* var. *pubescens*. 1, 3, 4, 5, from Mt. Ryuwo, Prov. Awa. 2, from Mt. Koya, Prov. Kii. (1, 2 ×ca. 1450)

HARA & KUROSAWA: **Differentiation within Anemone Hepatica.**